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ABSTRACT

This study represents the first to empirically validate the structure of social self-concept (SC) as proposed by the Shavelson model. For each of three age groups--preadolescents (252 3rd graders), early adolescents (290 7th graders), and late adolescents (335 11th graders)--analyses of covariance structures were used to test: (1) that social SC is both multidimensionally and hierarchically structured and (2) that causal direction underlying SC formation flows from social behavior at the base of the hierarchy, up through the network of social SC facets, to general SC at its apex. Results reveal a multidimensional structure that becomes more differentiated with age, but fail to yield any clear hierarchical pattern, regardless of age. Although the hypothesized direction of cause was strongly supported, and the structure of social SC basically similar across age, there were nonetheless several interesting developmental dissimilarities. Findings provide an important springboard for further construct validity research bearing on the structure and measurement of social SC. (Contains 74 references, 4 tables, and 7 figures.) (Author/SLD)

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Validating Social Self-concept Structure for Early/Late Preadolescents and Adolescents

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Abstract

This study represents the first to empirically validate the structure of social self-concept (SC), as proposed by the Shavelson model. For each of three age groups - preadolescents (grade 3), early adolescents (grade 7), late adolescents (grade 11), analyses of covariance structures were used to test: (a) that social SC is both multidimensionally and hierarchically-structured, and (b) that causal direction underlying SC formation flows from social behavior at the base of the hierarchy, up through the network of social SC facets, to general SC at its apex. Results revealed a multidimensional structure that becomes more differentiated with age, but failed to yield any clear hierarchical pattern, regardless of age. Although the hypothesized direction of cause was strongly supported, and the structure of social SC basically similar across age, there were nonetheless several interesting developmental dissimilarities. Findings provide an important springboard for further construct validity research bearing on the structure and measurement of social SC.

Validating Social Self-concept Structure for Early/Late Preadolescents and Adolescents

This study extends the work of Byrne (1986; Byrne & Shavelson, 1986, 1987), Marsh (1990; Marsh & Shavelson, 1985; Marsh, Byrne & Shavelson, 1989), and Shavelson (Shavelson & Bolus, 1982; Shavelson & Marsh, 1986) in validating a multifaceted, hierarchical model of self-concept (SC), as originally proposed by Shavelson, Hubner, and Stanton (1976). In contrast to previous construct validity research, which has focused solely on the academic component of the model, our interest here shifts to the nonacademic portion of the model and concentrates on the social SC framework. In broad terms, the intent of the study was to validate a more precise version of the social SC structure proposed by the Shavelson model, for preadolescents, early adolescents, and late adolescents.

The study of SC has a long history in the field of social science research (see e.g., Wells & Marwell, 1976; Wylie, 1974). It is valued as a desirable outcome in many psychological and educational situations, and is frequently posited as a mediating variable that facilitates the attainment of other desired outcomes such as academic performance and social competence (Markus & Wurf, 1987). Despite a wealth of research findings bearing on substantive issues related to the topic, however, systematic reviews have revealed inconsistent and indeterminant findings, with methodological weaknesses being cited as the major contributing factor (see e.g, Byrne, 1984; Hansford & Hattie, 1982; Hughes, 1984; Shavelson et al., 1976; West, Fish, & Stevens, 1980; Wylie, 1974, 1979). Additional complexity has derived from the failure of researchers to take developmental factors into account in their assessments of SC (Damon & Hart, 1982; Harter, 1988, 90; L'Ecuyer, 1992). In particular, most studies have not been anchored to a clear and validated theoretical framework that addresses developmental differences, making it difficult, if not impossible, to make valid interpretations of the findings. Almost two decades ago, Shavelson et al. cautioned that unless researchers

attended to these important aspects of construct validity, the generalizability of SC findings would continue to be ambiguous and contradictory.

To stimulate such construct validity research, Shavelson and colleagues (1976), drawing from the early theories of James (1892) and Cooley (1902), proposed one of the first models of SC capable of being tested empirically. Reflecting the Jamesian tradition, this model (commonly cited as the Shavelson model) portrayed a multidimensional and hierarchically-ordered SC structure, with global perceptions of self as a person (i.e., general self-concept) at the apex, and actual behavior at the base; moving from the top to the bottom of the hierarchy, the structure became increasingly differentiated. More specifically, global self-concept was shown to split into two facets - academic and nonacademic (i.e., physical, social, emotional) SCs; these facets, in turn, divided into separate and more specific components (e.g., mathematics SC). A schematic representation of the initially proposed Shavelson model is shown in Figure 1.

Insert Figure 1 about here

Consistent with the Cooley (1902) tradition, Shavelson et al. (1976) argued that perceptions of self are formulated relative to one's actual behavior, and/or to the reactions and evaluations of others relative to this behavior. Thus, they postulated a direction of causal flow progressing from actual performance at the base, to overall perceptions of self at the apex. For example, the model as schematically presented in Figure 1, hypothesizes that social behavior (with peers) provides the stimulus for the formation of peer social SC (i.e., self-perceptions of social competence relative to peers) which in turn, "causes" social SC in general (i.e., self-perceptions of social competence in general), which ultimately leads to general SC (perceptions of self in general). Although Shavelson et al. (1976) further characterized SC as have five additional features, only the developmental

issue is of relevance here. As such, SC is hypothesized as becoming increasingly multifaceted with age.

Since its inception, the Shavelson model has undergone extensive construct validation. However, with the exception of one study (Song & Hattie, 1984), virtually all research designed to validate its theoretical structure[1] has focused on the academic component of the model. Although findings from this research bear importantly on the present study, limitations of space preclude its comprehensive review; readers are referred, instead, to Byrne (in press a), and Marsh (1993a). Three conclusions from this validation work are of particular import here. First, based on a plethora of evidence across various populations, it seems clear that academic SC is multidimensionally structured. Second, although academic SC is basically hierarchically ordered, there is some indication that this structure differs slightly from the one postulated by Shavelson et al., (1976) (see Marsh, 1990; Marsh & Shavelson, 1985; Marsh et al., 1989). (But, see Hattie [1992] who argues that the supporting evidence is weak.) Finally, substantial research has demonstrated that SC structure becomes increasingly differentiated, and the hierarchical structure less distinctive with age.

We turn our attention now, to the nonacademic portion of the Shavelson model and, in particular, to its social SC component. Consistent with the academic side of the model, Shavelson et al. (1976) proposed a multifaceted social SC consisting of a general social dimension (e.g., I get along with people in general) and two specific dimensions -- one related to peers (e.g., I get along with my peers), and one related to significant others (e.g., I get along with the important people in my life). Relatedly, they further hypothesized social SC to be hierarchically structured. As such, correlations between specific social SCs (e.g., peer social SC) and general social SC will be highest, correlations between general social SC and general SC the next highest, and those between general SC and specific social SCs the lowest.

However, the structure of social SC as shown in Figure 1 was intended only as a general representation of the dimensional structure. Thus, in order

to test hypotheses related to the structure of social SC, the original model required certain modifications. First, since peers represent one category of significant others, one of the two specific social SCs, as indicated in Figure 1, was eliminated. Second, based on the theoretical perspective that self-conceptions derive from social comparison and social interaction with others (e.g., Cooley, 1902; Markus & Wurf, 1987; Marsh, 1987; Suls & Miller, 1977), and on empirical findings from substantive research that has considered these processes (Song & Hattie, 1984; Hartup, 1980; Youniss, 1980), it seems evident that the global social SC can be decomposed hierarchically into two major facets that reflect a more specific context -- social SC as it relates to the school environment, and social SC as it relates to the family. Finally, given the known potency of (a) the immediate social environment (McGuire & McGuire, 1982), (b) the extent to which significant others within a specific social environment know the subject (Marsh & Byrne, 1993; McCrae, 1991), and (c) the importance of self-representation relative to different social contexts (Hart, 1988) on the formation of self-conceptions, it is seems reasonable to hypothesize that, within each of the school and family dimensions, the social SC facet can be further subdivided into two even more specific facets. As such, social SC (school) can be decomposed into social SC (peers in classroom) and social SC (teachers); likewise, social SC (family) can be decomposed into social SC (siblings) and social SC (parents). This modification of the social SC component of the Shavelson model is presented schematically in Figure 2.

Insert Figure 2 about here

Social SC represents one's perception of his/her social competence with respect to social interaction with others, and derives from the assessment of one's behavior within a given social context (Markus & Wurf, 1987; Vallacher & Wegner, 1987). In the present study, perceptions of social competence were based on one's behavioral conduct relative to two specific social contexts -

one within the school, the other within the family, as defined by the hypothesized model (see Figure 2). As with the academic component of the Shavelson model, the most specific social SCs are located at the base of the hierarchy where they are anchored in concrete experience. For example, the model argues that perception of social competence with classroom peers should derive from actual behavior representative of these social interactions.

Based on empirical research related to the structure of SC in general (Harter, 1990; L'Ecuyer, 1981, 1992; Marsh & Hattie, in press), and academic SC in particular (see Marsh, 1993b), the present study argued for a social SC structure that becomes increasingly differentiated with age. Indeed, given the known increased salience of the social self in adolescence (Damon & Hart, 1982), as well as the formation of multiple social selves pertinent to particualr social contexts (Hart, 1988), we expected this multifaceted structure to be particularly well-defined for our sample of high school students. Additionally, from the important longitudinal work of L'Ecuyer (1981, 1992), it now seems apparent that, at various stages of the lifecycle, salience associated with any one or more facets in the hierarchical structure of SC can change, often triggering an alteration in their hierarchical order. In light of this research, and supported by Harter (1985a), we tested for a hierarchical social SC structure for pre-, early, and late adolescents, but expected the strength of component links in each of these structures to vary with age.

In summary, taking a developmental perspective, the present study broke new ground in validating the social SC module of the Shavelson model, but did so based on a more explicit structure than the one originally proposed by Shavelson et al. (1976). Specifically, the study had three purposes: (a) to test for the multidimensionality of social SC for each of three age groups - preadolescents (grade 3), early adolescents (grade 7), and late adolescents (grade 11), (b) to test for the hierarchical structure of social SC for each age group, and (c) to test for causal direction flowing from social behavior at the base of the hierarchy, to perceptions of general SC at the apex of the

hierarchy for each age group.

Method

Sample and Procedures

Of approximately 400 students sampled at each of three grade levels, parental consent was received for 252 grade 3, 290 grade 7, and 335 grade 11 students, respectively. By necessity, selection of subjects was based on classroom units; only children for whom signed consent was received participated in the study.

For each class, data were collected in two separate sessions by trained research assistants; self-report data were obtained in the first session, peer rating data in the second. At each grade level, completion of self-report and peer rating instruments was preceded by a thorough explanation of the response format, accompanied by a demonstration of several examples. For purposes of additional clarification at the grade 3 level, items were read aloud. All self and peer rating instruments were administered by the same trained research assistant. Teachers were given a 3-day period in which to complete a rating scale for each eligible student in their class. Parent ratings were mailed directly to the researchers.

Measuring Instruments

Assessments of social competence were obtained from several perspectives. Self-perceptions (i.e., social SC) were measured using two independent self-report scales, both of which had been constructed to address developmental differences in the conceptual bases of self-evaluations (see Damon & Hart, 1982; Stone & Lemanek, 1990). Perceptions by significant others were obtained from peer, teacher, and parent ratings of social behavioral conduct. Despite a change in order of importance at different developmental stages (Juhasz, 1989), research has shown these significant others to play a critical role in the self-perceptions of children and adolescents. A more detailed description of these measures follows.

Self report measures. Multiple facets of self-perceived social competence (i.e., social SCs) were measured using original as well as adapted

subscales from the Self Description Questionnaires (SDQs) I, II, and III (Marsh, 1990c, 1990d, 1990e) and the Self-Perception Profile for Children (SPPC; Harter, 1985b). The Shavelson model of SC provides the theoretical framework for the SDQ instruments, each of which targets a particular age group. The SDQ-I is appropriate for use with preadolescents (grades 2-6), and is structured on a 5-point likert scaling format that ranges from "false" to "true", indicating the extent to which respondents agree or disagree with self-descriptive statements related to their social competence. The SDQ-II is designed for use with early adolescents (grades 7-11) and incorporates a 6-point likert scaling format (false - true); the SDQ-III is appropriate for use with late adolescents (grade 11-college), and is based on an 8-point likert scaling format (definitely false - definitely true). Reported findings from a plethora of construct validity research have provided ample evidence supporting the psychometric soundness of all three SDQ instruments (for reviews, see Marsh, 1990c, 1990d, 1990e).

For purposes of the present study, only SDQ subscales tapping general SC and social SCs related to peers and parents were of interest. While social SC is measured by the SDQ-I using a single subscale, the construct is measured more specifically by the SDQ-II and SDQ-III using two subscales - Social SC (same sex peers) and Social SC (opposite sex peers). Due to data collection time constraints inposed by school authorities, only four items from each SDQ subscale were used; selection targetted those having the highest reported reliability values. Two factors bore importantly on this reduction: (a) the necessary incorporation of additional items to measure social SCs related to school, classmates, teachers, family, and siblings, and (b) the decision to use two independent measurement scales in an effort to avoid possible instrument bias. Four items, adapted from other items in the original Social and Parent SC subscales, were used to measure each of these additional constructs.

The second self-report measure, the SPPC (Harter, 1985), has also demonstrated strong psychometric properties. Subscale internal consistency

reliabilies ranging from .80 to .90 have been reported; test-retest correlations over one-month to one-year intervals have ranged from .40 to .65 (Harter, 1990). Its selection here was based on evidence of high concurrent validity with the SDQ (Byrne & Schneider, 1988). The SPPC is designed for use with children aged 8 to 15, and measures five specific SC domains (scholastic, athletic, social, physical appearance, behavioral conduct), in addition to global self-worth; only the social SC and global self-worth subscales were of interest here. Each subscale is composed of six items constructed on an alternative format that forces the respondent to first determine which of two statements best describes him/her, and then, to decide whether the statement is "really true" or just "sort of true" for him/her. Each item is structured as a 4-point scale.[2]

As with the SDQ instruments, additional items were created by modifying original items appropriate for the measurement of social SC related to school, classmates, and teachers. In contrast to the SDQ measures, however, all six items in the original SPPC subscales were used with students in grades 3 and 7 only. Given the development of the SPPC for use with preadolescents and early adolescents, in addition to the imposed time constraints, it was necessary to alter the instrument for use with grade 11 students.[3] To address both of these concerns, only two items per subscale (original and adapted) were used to measure the underlying construct, and the scaling of each was changed to a likert-type format.

Peer rating measures. Two peer rating instruments were used. The Revised Class Play (RCP; Masten, Morison, & Pellegrine, 1985), designed for use with children in grades 3 through 8, was used in measuring peer-perceived social competence for the preadolescent and early adolescent samples; only items related to the Sociability subscale were used. As such, children were asked to select classmates whom they considered best suited to playing a role depicting positive social behavior in an imaginary class play. As a reminder to the children of who was eligible for votes, an alphabetical roster listing all students in the class (including all absentees, but excluding those for whom

parental consent had not been obtained) was included with the answer sheet. The RCP has been shown to have internal consistency reliabilities in the .81 to .95 range, and stability coefficients ranging from .84 to .88 over a 6-month lag period (Masten et al., 1985).

Peer ratings for grade 11 children were based on the Social Competence subscale of the Adjustment Scales for Sociometric Evaluation of Secondary School Students (ASSESS: Prinz, Swan, Liebert, Weintraub, & Neil, 1978). Presented with a roster of eligible (defined above) classmates, and a checklist of 10 trait descriptions, respondents were asked to identify traits which best characterized each of their classroom peers. Prinz et al. have reported item-to-scale correlations ranging from .69 to .91 ($\underline{M}$ = .84), internal consistency reliability of .95, and test-retest reliability of .91 for the Social Competence subscale.

Teacher and parent rating measures. These ratings were based on the Scale of Actual Behavior (Harter, 1985b) which was designed to parallel the self-report measure in both format and content. For purposes of the present study, only items tapping Behavioral Conduct were relevant. These items were adapted to make them specific to the measurement of social behavior with classmates and teachers for the Teacher Rating Scale, and with siblings and parents for the Parent Rating Scale. To address time constraints related to the rating of students by teachers, only two of a possible three items (based on the original scale) were used to measure each behavioral construct. Pertinent to grade 11 students only, these items were based on the same 4-point likert scale format as the self-report measure. For consistency, the teacher and parent rating instruments were identical in both length and basic item stem. Based on data from four independent samples, Harter (1985) has reported internal consistency reliabilities ranging from .71 to .77 ($\underline{M}$ = .74) for the Behavioral Conduct subscale.

Analysis of the Data

Confirmatory factor analytic (CFA) and structural equation modeling (SEM) procedures were used to test hypotheses bearing on the structure of

social SC. All procedures were based on the analysis of covariance structures using the EQS (Bentler, 1992) program. Analyses were conducted in four stages for each grade separately. First, to facilitate interpretation, particular items were reflected such that high scores represented highly positive perceptions. Items were then combined to form multiple measurement indicators of each construct. In total, 26 indicators were used to measure the hypothesized CFA model for grade 3, and 35 to measure the full SEM model; for grades 7 and 11, there were 28 CFA, and 37 SEM indicators. Second, to ascertain the viability of a multidimensional structure of social SC, a series of sequentially nested CFA models were tested and compared for goodness-of-fit to the data. Third, based on the best-fitting model from these analyses, latent correlations among social SC facets were assessed to determine if they fitted the pattern of hierarchical structure proposed in Figure 2. Finally, to validate hypothesized causal flow related to this hierarchical structure, a full structural equation model was specified and tested for goodness-of fit. Given evidence of inadequate statistical fit, and only if the misspecification made theoretical sense, the model was respecified to include additional causal paths identified by the Lagrange Multiplier Test (LM-Test) as those that would contribute most to a significantly better-fitting model. Once the final best-fitting model was determined, nonsignificant parameters, as identified by the Wald Test (W-Test), were deleted. A more detailed description of both the models and goodness-of-fit criteria now follows.

Hypothesized models. The CFA model in the present paper hypothesized a priori that: (a) social SC structure would be described best by 8 factors for grade 3 students, and by 10 factors for grades 7 and 11 students, (b) each indicator variable would have a non-zero loading on the social SC factor it was designed to measure, and zero loadings on all other factors, (c) these factors would be correlated, and (d) measurement error terms would be uncorrelated.

The full SEM model argued for the formation of social SC facets on the basis of self-perceptions of one's own social behavior. Specifically, this

model hypothesized a priori that: (a) social behavior relative classroom peers, classroom teachers, brother/sisters, and parents would influence the formation of social SCs bearing on each of these four significant other groups, respectively. (For grades 7 and 11, social behavior was hypothesized to first lead to social SCs relative to opposite- and same-sex peers which, in turn, would lead to the formation of social SC related to classroom peers in general.) Social SC (classroom peers) and social SC (teachers) would lead to social SC relative to school in general, while social SC (siblings) and social SC (parents) would lead to social SC relative to family in general. Finally, social SC (school) and social SC (family) would generate the formation of overall social SC which, in turn, would generate general SC, (b) specification of social SC structure would be specific to, and consistent with the final best-fitting CFA model for each grade level, and (c) given expectations of perceived overlapping item content, correlated measurement errors were specified between teacher ratings of social behavior relative to classroom peers and teachers, and between parent ratings of social behavior relative to siblings and parent.

To assist the reader in conceptualizing these hypothesized models, we can review Figure 2. For grade 3 only, the CFA model is represented by the social SC structure shown above the dotted line; the SEM model includes all constructs as shown, but would be represented by one-way arrows leading from the behavioral constructs at the base of the hierarchy through to general SC at the apex. For grades 7 and 11, both the CFA and SEM models would include the two additional social SC facets related to opposite-sex and same-sex peers.

Goodness-of-fit criteria. Evaluation of model fit was based on multiple criteria that took substantive, statistical, and practical fit into account. Specifically, these criteria included: (a) the substantive meaningfulness of the model (MacCallum, 1986), (b) the χ^2 likelihood ratio statistic, (c) the Satorra-Bentler Scaled Statistic (S-B χ^2; Satorra & Bentler, 1988), (d) the Comparative Fit Index (CFI; Bentler, 1990), and (e) the Expected Cross-

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validation Index (ECVI; Browne & Cudeck, 1989).

The χ^2 likelihood ratio statistic, in practice, is more useful when regarded as a **measure** of fit, rather than as a **test** statistic (Joreskog & Sorbom, 1993). As such, the χ^2 value measures the closeness of fit between the sample covariance matrix and the fitted covariance matrix, serving therefore as an indicator of overall model fit. However, given the known dependency of the χ^2 statistic on sample size and the grounding of covariance structure analysis in large sample theory, findings typically indicate a need to modify the model in order to better fit the data (Joreskog & Sorbom, 1993). As a consequence, it has become customary to base evaluation of model on pratical indices of fit such as the CFI described below.

The S-Bχ^2 incorporates a scaling correction for the χ^2 statistic when distributional assumptions are violated. Its computation takes into account the model, the estimation method, and the sample kurtosis values (Hu, Bentler, & Kano, 1992). The S-Bχ^2 has been shown to more closely approximate χ^2 than the uncorrected test statistic, to have robust standard errors, and to perform as well, or better than the usual asymptotically distribution-free (i.e., no assumption of multivariate normality) methods generally recommended for nonnormal multivariate data (Bentler, 1992; Hu et al., 1992).

The CFI, a revised version of the Bentler-Bonett (1980) normed fit index that adjusts for degrees of freedom, ranges in value from zero to 1.00. It is derived from the comparison of a restricted model (i.e., one in which structure is imposed on the data) with an independence (or null) model (one in which all correlations among variables are zero) in the determination of goodness-of-fit. Although, a CFI value of .90 has served as the rule-of-thumb lower limit cutpoint of acceptable fit, a value of at least .93 is expected for models considered to be well-fitting. In this paper, I include also, a corrected CFI value (CFI*) that is computed from the S-Bχ^2 (for an elaboration of this procedure, see Byrne, 1994).

The ECVI was proposed as a means to assessing, in a single sample, the likelihood that the model cross-validates across similar-sized samples from

the same population (Browne & Cudeck, 1989). Specifically, it measures the discrepancy between the fitted covariance matrix in the analyzed sample, and the expected covariance matrix that would be obtained in another sample of equivalent size. Application of the ECVI assumes a comparison of models whereby an ECVI index is computed for each model and then all ECVI values placed in rank order; the model having the smallest ECVI value exhibits the greatest potential for replication.

Given (a) the propensity of pairwise deleted correlational data to yield a non-positive definite covariance matrix (Bentler & Chou, 1987; Kaplan, 1990), and (b) the caveat that current structural modeling methods were designed for use with complete data (Bentler & Chou, 1987; Hayduk, 1987), it was considered most appropriate to base analyses on listwise-deleted data. Two additional considerations were deemed important in establishing final sample sizes thereby leading to further trimming of the data. First, given the postulation of a sibling SSC facet in the family component of the hypothesized model, all respondents who reported having no brothers or sisters were excluded from the analyses. This reduction resulted in sample sizes of 218, 255, and 311 for grades 3, 7, and 11, respectively; these data were used in the CFA testing of multidimensional and hierarchical structures. Second, because (a) the testing of causal direction included ratings of social behavior by teachers, peers, and parents, and (b) a modest return of parent data yielded substantial nonrandom missing data (see Muthen, Kaplan, & Hollis, 1987), further trimming of the data was conducted. Thus, analyses of the full structural equation models were based on final samples of 167 grade 3, 175 grade 7, and 143 grade 11 students. To address the issue of possible differences between the CFA and SEM samples, tests for invariance were conducted between the complete data SEM and the missing data SEM samples (see Bentler, 1992).

Results

Preliminary analyses determined some evidence of multivariate positive kurtosis for each teacher group; normalized Mardia coefficients were 17.69,

29.01, and 30.88 for grades 3, 7, and 11, respectively. Because it is possible that such nonnormality could lead to downwardly biased standard errors thereby resulting in an inflated number of statistically significant parameters (Muthén & Kaplan, 1985), final assessment of fit was based on the S-Bχ^2 which corrects for this violation, and on its related CFI* and ECVI* indices which use this statistic in their computation. For sake of completeness, the uncorrected χ^2, is also reported in the appropriate tables. Preliminary analyses also identified one multivariate outlier in each of the grade 3 and grade 11 samples. These cases were subsequently deleted from all analyses.

We turn now to findings from the primary analyses of the study. These are presented separately for each grade in accordance with the particular question addressed.

The Multidimensionality of Social Self-concept

Preadolescents (Grade 3)

Based on the model presented in Figure 2, a 5-factor structure of social SC was hypothesized and tested for grade 3 students. As noted by Byrne and Shavelson (1986) in their testing of academic SC for adolescents, it is possible that self-concept is a unidimensional construct and that separate, more specific facets do not exist. Thus in specifying a model of social SC for grade 3 (and for the other two grades), general SC was also included as one of the factors; the remaining factors were: social SC (in general), social SC (school), social SC (classmates), and social SC (teachers). These results are presented in Table 1.

Insert Table 1 about here

As indicated by the CFI* value of .83 reported in Table 1, the fit of the initially hypothesized model was clearly less than adequate. However, a review of the multivariate LMχ^2 values identified several error covariances, that if freely estimated, would lead to a substantial drop in χ^2 and, thus, a better-fitting model. These parameters, typically referred to as correlated

errors, are not uncommon in the analysis of covariance structures, particularly when based on psychological data. They represent systematic, rather than random measurement error in item responses and can derive from redundant item content (see e.g., Byrne, in pressb), or bias arising from a response pattern (e.g., Byrne & Shavelson, 1986), yea/nay-saying, social desirability, and the like (Aish & Joreskog, 1990). Specification of correlated errors, as with the specification of other parameters in covariance structure modeling, must be supported substantively; to do so merely for purposes of achieving a better-fitting model is not an acceptable practice.

In the present case, the largest LM statistics identified nine correlated errors associated with item pair indicators from the same measuring instrument; seven of the nine involved the more specific SSC facets related to school, classmates and teachers. Given that items constructed to measure these more specific facets were based on item stems taken from the general social SC subscale, the presence of such correlated errors would seem to be psychometrically reasonable. Additional support for their presence may be explained by developmental research that has shown the inability of young children to adequately differentiate among SC dimensions (Harter, 1988, 1990). On the basis of these substantive arguments, the initially hypothesized model was respecified to include the nine error covariances noted above.

To assess the extent to which a respecified model exhibits improvement in fit, it has become customary to examine the difference in χ^2 ($\Delta\chi^2$) between the two models. Doing so, however, presumes that the two models are nested in the sense that the free parameters in one model are a subset of those in the other (Bollen, 1989). The differential between the models represents a measurement of the overidentifying constraints and is itself χ^2-distributed, with degrees of freedom equal to the difference in degrees of freedom (Δdf); it can thus be tested statistically, with a significant $\Delta\chi^2$ indicating substantial improvement in model fit. The measurement of model effect differential reported here, and throughout the remainder of the paper, is based on the S-B χ^2 difference (ΔS-Bχ^2). As such, incorporation into the model

of the nine parameters noted above resulted in a statistically better-fitting model for grade 3 students ($\Delta S\text{-}B\chi^2_{(9)}=329.41$); additionally, the difference in CFI* values was substantial (.10).

That the fit of this final 8-factor model (Model 2) is well-fitting, as indicated by a CFI*=.93, and is likely to be more replicable (as shown by the lower ECVI value) than the initially hypothesized model, argues convincingly for its more appropriate representation of the data for grade 3 children.

To address the question of a multidimensional SC, Model 2 was tested next tested against a 4-factor model that argued against the existence of the more specific factors of School Social SC as it relates to classroom peers and teachers, and of Family Sical SCas it relates to siblings and parents. As indicated in Table 1, this model differed little from the initial 8-factor model (*CFI=.93 vs .90). Two additional models were specified; one argued for a 2-factor structure composed of general SC and a global social SC, the other argued that SC is unidimensional and thus represented by a single general SC factor. As can be seen Table 1, although the fit of these models was equally poor-fitting than the other two multidimensional models, the difference in overall model fit was nonetheless modest at best. These results suggest that although social SC structure for grade 3 students is most optimally described by a multidimensional structure, differentiation among the individual dimensions is relatively weak.

Early Adolescents (Grade 7)

An important modification of the hypothesized social SC model (Figure 2) for early and late adolescents involved splitting the social SC (general) facet into two additional components - social SC (opposite sex) and social SC (same sex). Thus, the social SC model tested for grade 7 comprised 10, rather than eight factors. This specification addressed the empirical work of Marsh (1990d,1990e) in developing the SDQ II and III that has shown social SC relative to peers to be gender-specific for early and late adolescents. According to this perspective, self-perceptions of social competence will differ depending on whether the peer is of the same sex, or of the opposite

sex. CFA results pertinent to this model are summarized in Table 2.

Insert Table 2 about here

As can be seen in Table 2, the initially hypothesized 10-factor model (Model 1) represented a reasonably well-fitting model (CFI*=.92). Nonetheless, examination of the multivariate LM χ^2 statistics revealed five distinctively large error covariances that, if set free, would yield a significant improvement in model fit. Because these parameters were considered to be substantively reasonable, as was the case earlier for preadolescents, the model was reestimated with these five error covariances specified. As shown in Table 4, this final best-fitting model for grade 7 (Model 2) yielded a CFI* value of .96.

Model 2 was tested next against a 6-factor model that argued against the presence of specific social SC factors related to gender-specific (i.e., other sex, same sex) peers, classroom peers and teachers. In contrast to the preadolescent data, this model differed substantially from the initial 10-factor model (CFI*=.96 vs. .88). Model fit varied negligibly for the 4-factor model, but deteriorated sharply for the 2- and 1-factor models. These findings argue strongly for a multidimensional structure of social SC for early adolescents, as represented here by grade 7 students.

Late Adolescents (Grade 11)

The CFA model to be tested for grade 11 students, as for those in grade 7, comprised 10 factors. Results for these analyses are presented in Table 3.

Insert Table 3 about here

As shown in Table 3, the initially hypothesized 10-factor model (Model 1) represented an exceptionally well-fitting model (CFI*=.95) for late adolescents. However, results yielded two very large LM χ^2 statistics representing error covariances associated with the same measuring instrument.

Given the size of these LM χ^2 values, and their sharp delineation from those remaining, a second model was estimated in which this additional parameter was specified. This model (Model 2) constituted the final model of social SC for grade 11 students.

As was the case for grade 7 students, Model 2 was subsequently tested against a 6-factor model that argued against the viability of more specific social SC factors. Consistent with findings for grade 7 students these analyses, as shown in Table 3, differed substantially from the initial 10-factor model (CFI*=.96 vs .85). Likewise, model fit varied negligibly for the 4-factor model, but deteriorated sharply for the 2- and 1-factor models. These findings, as noted for grade 7 children, argue strongly for a multidimensional structure of social SC for adolescents.

The Hierarchical Structure of Social Self-concept

Preadolescents (Grade 3)

A hierarchical ordering of SC dimensions would argue that general SC should correlate highest with social SC (general), next highest with social SC (school) and social SC (family), and least with the more specific facets of social SC as they relate to both the school (classmates, teachers) and the family (siblings, parents). To evaluate evidence of such structure, we now examine relations among these eight latent constructs, as postulated in Figure 2. A summary of these relations is presented pictorially in Figure 3.

Insert Figure 3 about here

Examination of these latent correlations supports our earlier CFA findings and further demonstrates why a multidimensional structure of social SC did not differ substantially from a unidimensional specification for grade 3 children. In addition to three perfect correlations, several others, particularly as they pertain to school-related factors, were exceptionally high (r>.90) thereby indicating the lack of differentiation among SC dimensions. These high correlations notwithstanding, the hierarchical ordering

of SC facets, as proposed by Shavelson et al. (1976), is somewhat evident albeit weak. For example, whereas general SC is very highly correlated with both social SC (general), and social SC (school), its link with the more specific social SC facets related to classmates and to teachers, is less strong. This pattern is not evident with respect to the family portion of the model.

Early Adolescents (Grade 7)

To allow for a more meaningful comparison of hierarchical social SC structure across the three age groups, the summary of latent construct relations for early (and late) adolescents shown in Figure 3 does not include the two factors related to opposite sex and same sex peers. Correlations bearing on these dimensions are presented separately in Figure 4.

Overall, examination of latent construct relations (Figure 3) for grade 7 children appears not to support a hierarchical ordering of social SC dimensions, at least as implied by Shavelson et al. (1976) and as hypothesized in Figure 2. For example, in reviewing the school side of the model, general SC correlated .55 with social SC (school), albeit .93 with the more specific facet of social SC (classmates) and .43 with social SC (teachers); the same pattern can be observed for the family portion of the structure.

We turn now to Figure 4 where the gender-specificity of peer relations are considered and, thus, the same sex/opposite sex facets of SC are included in the model.

Insert Figure 4 about here

In reviewing latent correlations for grade 7 children, we can see clearly that the extent to which one gets along with his/her same sex peers bore more importantly on social SC in general (r=.84), as it relates to school (r=.87), and with respect to school classmates in particular (r=.92), than it did when based on social interaction with the opposite sex (r=.57, .58, .56, respectively).

Adolescents (Grade 11)

Consistent with the findings for grade 7 children, hierarchical structure for late adolescents is not apparent. Here again, relations among the social SC facets were random, rather than ordered into any particular pattern. Nonetheless, two interesting and important differences between the early and late adolescent samples is notable. These involve (a) the influence of teachers in explaining variance related to both social SC in general (r=.18 versus r=.44), and as it relates to the school environment (r=.21 versus r=.40), and (b) the influence of family factors in explaining variance associated with global social SC. Specifically, whereas the correlation between social SC (general) and social SC (family) was moderately high for late adolescents (r=.35), it was relatively modest (r=.24) for early adolescents. More dramatic differences evolve when the factors focus on siblings and parents separately. Whereas minimal variance related to a globalized social SC was explained by either sibling social SC (r=.14) or parent social SC (r=.15) for early adolescents, substantially greater variance was explained by these factors for late adolescents (siblings r=.35; parents r=.25).

Turning to Figure 4, we can now determine the extent to which a same sex/opposite sex frame of reference colored relations among these social SC facets for high school students. Consistent with findings for grade 7 students, perceived social competence with same sex peers was strongly correlated with social SC in general (r=.82), social SC (school; r=.77), and social SC (classmates; r=.84). However, as might be expected for this age group, self-perceptions of social competence with respect to the opposite sex were more strongly related to a globalized social SC (r=.76), to social SC (school; r=.64), and to social SC (classmates; r=.62) than were evidenced for grade 7 students.

Causal Flow From Social Behavior to Social/General Self-concepts

Consistent with Shavelson et al.'s conceptionalization of SC structure and formation of SC facets, the model shown in Figure 2 was specified as a

full structural equation model with direction of cause flowing from the four social behavior constructs at the base, to general SC at the apex via the hierarchical network of decreasingly specific social SCs. For example, behavioral conduct relative to classmates was hypothesized to "cause" self-perceptions of this behavior (i.e., social SC [classmates]), which in turn leads to self-perceptions of social competence bearing on school in general (i.e., social SC [school]), which then leads to self-perceptions of social competence in general (i.e., social SC [general]), and finally to perceptions of self in general (i.e., general SC). Evaluation of model fit furnished the means for testing this postulated causal direction. It also provided for an additional test of hierarchical structure, albeit from a different perspective. Results based on these analyses, although reported separately for each age group, are summarized collectively in Table 4.

Insert Table 4 about here

Preadolescents (Grade 3)

As indicated by the CFI* value of .85 reported in Table 4, the hypothesized model (Model 1), for grade 3 children, was not well-fitting. A review of the multivariate LM χ^2 statistics revealed misspecification related to the exclusion of two structural paths that reflected the impact of social SC (parents) and social SC (classmates) on social SC (teachers). Reestimation with these parameters included yielded a significantly improved ($S\text{-}B\Delta\chi^2_{(2)}$ = 114.64, $p<.001$) and well-fitting CFI*=.93) model (Model 2). Application of the Wald Test to this model identified four nonsignificant structural paths. These parameters, as footnoted in Table 4, were subsequently deleted in the specification of Model 3.[3] Given an excellent fit (CFI*=.95), supported by the lowest ECVI* of the three computed, Model 3 was deemed optimal in representing the data for grade 3 children.

Early Adolescents (Grade 7)

For grade 7 children, the initial model of hypothesized causal direction

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also indicated a poor fit (CFI*=.85). Examination of the LMTest statistics identified five structural paths and two correlated errors that, if included in the model, would lead to a substantially beter fit. Estimation of Model 2 in which these parameters were specified (see footnote, Table 4), yielded a significant improvement in fit ($S\text{-}B\Delta\chi^2_{(7)}$=342.10, p<.001; CFI*=.95). Finally, in testing multivariately for nonsignificant model parameters, the Wald Test identified the four structural paths footnoted in Table 4. This final model (Model 3) was well-fitting and exhibited the lowest of the three ECVI* values; it was therefore deemed the most appropriate in modeling the grade 7 data.

Late Adolescents (Grade 11)

As shown in Table 4, the hypothesized model for late adolescents fit marginally well (CFI*=.90). The LMTest, however, indicated that the specification of four additional structural paths (see footnote, Table 4) would yield a substantially better-fitting model. The model was subsequently respecified to address this misspecification (Model 2); reestimation again resulted in significant improvement in model fit ($S\text{-}B\Delta\chi^2_{(4)}$=88.92, p<.001; CFI*=.93). Finally, the Wald test revealed two structural paths and one correlated error to be nonsignificant. The estimation of Model 3 reflected these misspecifications and yielded an equally well-fitting, albeit more parsimonious model. These results, accompanied by the lowest ECVI* value led us to consider this model to be most optimal in representing the grade 11 data.

Tests of Missing Data Models

Of critical import in these tests for causal direction were the small samples that arose following the deletion of all cases having incomplete parental data. Given that these data were not missing completely at random (see Muthen et al., 1987), the argument could be made that selection bias contributed to the sample containing the missing data (grade 3, n=58; grade 7, n=87; grade 11, n=175) being different from the sample containing complete data. To address this issue, at each grade level, we tested a multisample model that constrained all factor loadings and structural paths equal across

complete and incomplete data samples. (For an extensive discussion of missing data models, see Bentler, 1992).

Findings from these tests of missing data models, in general, argued for the equivalence of comparison groups. For preadolescents, all constrained parameters were tenable except for one factor loading and one structural path (social SC [parents] ->social SC [teachers]). Nonetheless, despite their inequality across groups, these parameters were found to be statistically significant within each group thereby arguing for the validity of the final model structure. For early adolescents, all equality constraints held across complete and incomplete samples. Finally, for late adolescents, equality constraints related to one factor loading and one structural parameter (soscial SC [school] ->social SC [general]) were found untenable. As for preadolescents, however, both parameters were statistically significant, thereby lending support for final model structure.

Summary and Discussion

This paper has summarized findings from a construct validity study of social SC structure, as partially conceptualized by Shavelson et al. (1976). In the interest of clarity, as well as consistency with the presentation of results, the ensuing discussion addresses each research question separately. We turn first to the issue of a multidimensional structure.

The Multidimensionality of Social Self-concept Structure

Findings from this study stand in strong support of previous research that has shown the dimensionality of self-concept in general (Harter, 1988, 1990; Damon & Hart, 1982; L'Ecuyer, 1981, 1992), and academic self-concept in particular (Marsh, 1993b), to be less distinctive for younger children. Our results, as they related to social SC structure, exhibited this pattern in three ways. First, although the CFA model specifying the largest number of factors fitted the data best for each grade level, the difference between this (final) model and the one subsequent to it that depicted fewer factors (Model 3), was very small for preadolescents (ΔCFI*=.03), slightly larger for early adolescents (Δ=.08) and large for late adolescents (ΔCFI*=.11). Second, the

number of correlated errors associated with modeled social SC structure was largest for preadolescents (9), somewhat smaller for early adolescents (5), and smallest for late adolescents (2). These parameters represent method effects that can derive from a high degree of overlapping item content thereby reflecting the inability of respondents to discriminate one factor from another. Finally, on average, correlations among the latent social SC facets were highest for preadolescents, more modest for early adolescents, and smallest for late adolescents.

As with other studies of SC that have taken a developmental perspective, (Harter, 1988, 1990); L'Ecuyer, 1981, 1992; Marsh, 1989), and consistent with principles of developmental theory (Werner, 1957), our results have clearly shown a more differentiated structure for older children. Moreover, these findings have also validated the need to consider gender (see Le'Ecuyer, 1981, 1992; Marsh, 1990d, 1990e) in the measurement of social SC for early and late adolescents. Overall, it seems clear that the formation of self-conceptions in children and adolescents, is based on sets of criteria that change contingent on a particular social context. For example, the presence of a positive social SC relative to parents might be based on a perception of being polite, obedient, helpful, and the like. On the other hand, social SC relative to classmates is more likely to be based on perceptions of being gregarious, talkative, and willing to share etc. Thus, although Hart's (1988) proposed existance of multiple selves related to the adolescent population only, our research would appear not only to support this notion, but to extend its application to the preadolescent years as well.

Finally, we consider it important to note that, while there is evidence of increasing differentiation of social SC with age, this process is multiplicative, rather than additive. In other words, as noted by Montemayer and Eisen (1977), it is not the case that older children add more facets to their self-conceptions; rather, it is simply that they evaluate themselves in different terms relative to the orthogenetic development of their social cognitions. For example, whereas grade 3 children might evaluate themselves in

terms of how many of their classmates like them, grade 11 children are likely to undertake this task in terms of how well they get along with their classmates. Thus, it is not so much that particular facets of social SC do not exist for younger children, but rather, that the social SC structure becomes more specific and differentiated with age (see also, Damon & Hart, 1982; L'Ecuyer, 1981, 1992; Harter, 1988, 1990).

The Hierarchical Structure of Social Self-concept

Consistent with the work of L'Ecuyer (1981, 1992), our results showed that, regardless of age, the postulated hierarchical structure of social SC appeared not to be organized into any set pattern. Furthermore, this network of SC facets was somewhat different for each age group. These findings would seem to support L'Ecuyer's contention that the fluctuating hierarchy of SC facets merely reflects a shift in the importance attached to these perceptions of self.

The fact that social SC (same-sex peers) correlated more strongly than social SC (opposite peers) with social SC facets related to school and to classmates, as well as with social SC in general, further supports L'Ecuyer's (1981, 1992) and Marsh's (1990d, 1990e) work. Accordingly, these findings would seem to validate their view that considerations of a gender effect should be taken into account in the measurement of social SC for adolescents.

Causal Flow from Social Behavior to Social/General Self-concepts

Testing for the nomological network of latent constructs that precipitate social SC formation yielded several interesting findings reflecting similarities as well as dissimilarities across age. Perhaps the most important outcome in testing our hypothesized causal structure was that, as expected, except for minor adjustments to the model for each age group, the basic pattern of hierarchical flow sustained an excellent fit to the data for each sample. We therefore feel confident in concluding that children, from preadolescence through late adolescence, form self-perceptions of their social competence in a pattern that moves from the specific to the general; the catalyst in the formation of these self-conceptions being the actual social

behavior displayed in one's interaction with others. As such, perceived social competence related to ones's classmates, for example, will derive from one's actual behavior in this regard; social SC related to classmates will, in turn, influence self-perceptions of social competence within the general school environment, which will subsequently trigger self-perceptions of social competence in general, which will ultimately contribute to how one feels about oneself in general (i.e., general SC). This general pattern of causal flow would seem to support Markus, Cross, and Wurf (1990) in their contention that before self-perceptions of competence can be formulated, one must first be able to observe the actual competence on which the self-perceptions are based. Within this broad framework of social SC structure, however, there are modifications which can vary with age. We turn now to a summary of these similarities and differences in the causal patterning of this structure.

Schematic representations of these social SC structures are portrayed in Figures 5, 6, and 7, for preadolescents, early adolescents, and late adolescents, respectfully. Associated with each structural path is the estimated value followed by the z-value in parentheses. These parenthesized values represent the estimate divided by its standard error, which in this study, are the corrected standard errors based on the S-Bχ^2 statistic. As is readily discernible from parenthesized values >1.96, all paths are statistically significant; those found to be nonsignificant have been deleted from the model.

Insert Figures 5, 6, and 7 about here

In reviewing Figures 5, 6, and 7, we can see first of all, that regardless of age, social SC appears to be firmly entrenched in the school environment. The most dramatic evidence of this fact lies with the missing path leading from social SC (family) to social SC (general); for each age group, it was found to be statistically nonsignificant. Indeed, except for the consistent influence of social SC (parents) on social SC (teachers), the

formation of social SCs relative to the family appears to operate as an independent process. These findings suggest very clearly, that the extent to which school-age children feel good (or bad) about about themselves with respect to their ability to get along with others is dominated soley by their social interaction experiences with peers and teachers within the school environment.

That a child's perception of social self relative to parents should impact significantly on his/her self-perception relative to teachers, whether in elementary, junior high, or high school, adds an interesting dimension to our hypothesized structure of social SC. Indeed, this finding supports the works of Beaumrind (1978) and Galbo (1983) in showing the impact of parents as significant adults. Here, in particular, it elucidates the extent to which parents serve as important catalysts in their child's perception of self with respect to how they get along with their teachers. Relatedly, a third consistency across grade level was the nonsignificant impact of social behavior (teachers) on social SC (teachers). Again, this finding concurs with those of Galbo (1983) in showing teachers, in general, to have relative little impact as significant adults. This important deletion in our original model suggests that, regardless of how children behave with their teachers, such behavior has absolutely no bearing on their self-perceived social competence in this regard; these self-perceptions appear to be formed, instead, on the basis of social interaction with parents. For preadolescents and late adolescents, however, these self-perceptions are further influenced by social SCs related to classmates (see Figures 5 and 7); this influence is more specifically related to same sex peers for the late adolescents. Thus, while it is likely that teachers serve as important significant adults with respect to a child's academic endeavours, their significance relative to the child's social behavior is negligible.

Several similarities in the modification of social SC structure can be noted for early and late adolescents, but appear not to be relevant for preadolescents. First, for both groups of adolescents, global SC is apparently

formed on the basis of two sets of information: (a) perceptions of one's social competence in general as derived initially from social interaction with peers, and (b) perceptions of one's social competence in the company of adults; while teachers and parents both represent these significant others for early adolescents, only parents are directly relevant for late adolescents, with teachers having only an indirect effect. These results may reflect Galbo's (1983) finding that, in identifying significant adults in their lives, adolescents considered role modeling to be a primary attribute. That adults have only an indirect and relatively minor impact on how third graders feel generally about themselves is perhaps not surprising since they are as yet, unable to relate to the adult world.

Finally, for both early and late adolescents, the impact of behavioral conduct with classmates was predominantly stronger in the formation of social SC (same sex classmates), than it was relative to opposite sex classmates. Relatedly, social SC (same sex classmates) had a substantially stronger effect than social SC (opposite sex classmates) on the formation of social SC (classmates in general). Interestingly, these findings seem to suggest that, for high school as well as junior high students, the extent to which one gets along with his/her same-sex peers is the critical element in determining one's self-perceptions of social competence with respect to one's classmates in general. On the basis of this study, as well as others concerned with significant others relative to adolescents (Galbo, 1983; Hoelter, 1984; McGuire & McGuire, 1982), it seems evident that gender has an important interaction effect. Although Galbo's work focused on significant adults, and McGuire and McGuire's on family members, our findings involving same-sex peers paralleled theirs in showing same-sex parents most likely to be chosen as significant others by adolescents. Perhaps weakening this parallel somewhat, was the finding by McGuire and McGuire that siblings who were selected as significant others were most likely to be of the opposite sex.

Dissimilarities in the causal flow of social SC formation were found to be most salient relative to two sets of path deletions, one unique to

preadolescents and the other, to early adolescents. The first of these bears on the nonsignificance of structural paths that initially led from behavioral conduct (siblings, parents) to the respective social SC facets. This finding suggests that, for grade 3 students, the only behavior that counts in judging one's own social competence is the extent to which he/she gets along with fellow classmates. These modifications to the behavioral base of the model further substantiate the causal pattern among the latent SC facets that show peer relations to be the primary determinants of perceived social competence in general. On the other hand, these nonsignificant structural paths may reflect a replication of Harter and Pike's (1984) finding that showed behavioral conduct and social acceptance to form one, rather than two factors for young children. Consistent with Harter's (1988, 1990) work, and with our earlier findings related to the multidimensionality of social SC, it may well be that grade 3 children are incapable of differentiating between their actual social behavior with teachers, siblings, and parents, and their self-perceptions of this behavior.

The second deletion, a modification unique to early adolescents, involves the deleted path from social SC (teachers) to social SC (school). This respecification argues that, regardless of how well grade 7 children perceive themselves as getting along with teachers, this relationship has no bearing whatsoever on how they judge their social competence within the school environment in general. Interestingly, however, social interaction with teachers did bear on their perceptions of self in general (see Figure 6). What this seems to be saying is that, for early adolescents, feeling good about themselves in general means getting along with all the important people in their lives (i.e., peers, teachers, family members); feeling good about themselves in terms of their social competence is dependent solely on how erll they get along with the other children at school.

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Footnotes

1. In contrast, many construct validity studies have tested the validity of measuring instruments theoretically linked to the Shavelson model (e.g., Marsh & O'Neill, 1984; Bracken & Howell, 1991).
2. In contrast to the SDQ II and III, the SPPC does not have subscales measuring perceived social competence relative to opposite- and same-sex peers.
3. Subsequent to the conduct of this study, Harter (1990) reported the development of an adolescent version of the SPPC.
4. The redundancy of three factors in the model necessitated the concomitant deletion of their related factor loadings and error/disturbance terms, thereby accounting for the large difference in degrees of freedom.

Table 1

Summary CFA Model Fit Statistics for Preadolescents (Grade 3)

	Model	χ^2	df	S-Bχ^2	CFI*	ECVI*
1	Initial 8-factor (GSC, SSCG, SSCS, SSCF, SSCC, SSCT, SSCB, SSCP)	914.24	271	813.93	.83	3.90
2	Final 8-factor (9 correlated errors)	539.56	262	484.52	.93	3.06
3	4-factor[a] (GSC, SSCG, SSCS, SSCF)	727.71	283	620.76	.90	3.50
4	2-factor[a] (GSC, SSCG)	968.83	289	810.87	.84	4.32
5	1-factor[a] (GSC)	968.84	290	810.93	.84	4.31

[a]Correlated errors from final 8-factor model retained.

S-Bχ^2 = Satorra-Bentler Scaled Statistic; CFI* = Comparative Fit Index based on S-Bχ^2; ECVI* = Expected Cross-validation Index based on S-Bχ^2

GSC = general self-concept (SC); SSCG = social SC (global);

SSCS = social SC (school); SSCF = social SC (family);

SSCC = social SC (classmates); SSCT = social SC (teachers);

SSCB = social SC (siblings); SSCP = social SC (parents)

Table 2

Summary CFA Model Fit Statistics for Early Adolescents (Grade 7)

	Model	χ^2	df	S-Bχ^2	CFI*	ECVI*
1	Initial 10-factor (GSC, SSCG, SSCO, SSCE, SSCS, SSCF, SSCC, SSCT, SSCB, SSCP)	913.36	305	773.29	.92	3.84
2	Final 10-factor (5 correlated errors)	604.74	300	511.60	.96	2.84
3	6-factor[a] (GSC, SSCG, SSCO, SSCE, SSCS, SSCF)	1264.53	330	1054.63	.88	4.75
3	4-factor[a] (GSC, SSCG, SSCS, SSCF)	1459.20	339	1203.79	.85	5.27
4	2-factor[a] (GSC, SSCG)	2323.08	344	1866.13	.74	7.84
5	1-factor[a] (GSC)	2656.25	344[b]	2097.92	.70	8.75

[a] Correlated errors from final 8-factor model retained

[b] One parameter constrained at lower-bound by EQS program

S-Bχ^2 = Satorra-Bentler Scaled Statistic; CFI* = Comparative Fit Index based on S-Bχ^2; ECVI* = Expected Cross-validation Index based on S-Bχ^2

GSC = general self-concept (SC); SSCG = social SC (global); SSCO = social SC (other sex); SSCE = social SC (same sex); SSCS = social SC (school); SSCF = social SC (family); SSCC = social SC (classmates); SSCT = social SC (teachers); SSCB = social SC (siblings); SSCP = social SC (parents)

Table 3

Summary CFA Model Fit Statistics for Late Adolescents (Grade 11)

	Model	χ^2	df	S-Bχ^2	CFI*	ECVI*
1	Initial 10-factor (GSC, SSCG, SSCO, SSCE, SSCS, SSCF, SSCC, SSCT, SSCB, SSCP)	694.13	305	612.24	.95	2.63
2	Final 10-factor (2 correlated errors)	568.27	303	504.92	.96	2.30
3	6-factor[a] (GSC, SSCG, SSCO, SSCE, SSCS, SSCF)	1396.08	333	1169.89	.85	4.26
3	4-factor[a] (GSC, SSCG, SSCS, SSCF)	1565.16	342	1295.17	.83	4.60
4	2-factor[a] (GSC, SSCG)	2327.02	347	1892.97	.73	6.51
5	1-factor[a] (GSC)	2592.21	348	2046.40	.70	7.00

[a] Correlated errors from final 8-factor model retained.

S-Bχ^2 = Satorra-Bentler Scaled Statistic; CFI* = Comparative Fit Index based on S-Bχ^2; ECVI* = Expected Cross-validation Index based on S-Bχ^2
GSC = general self-concept (SC); SSCG = social SC (global);
SSCO = social SC (other sex); SSCE = social SC (same sex);
SSCS = social SC (school); SSCF = social SC (family);
SSCC = social SC (classmates); SSCT = social SC (teachers);
SSCB = social SC (siblings); SSCP = social SC (parents)

Table 4

Summary Structural Equation Model Fit Statistics

Model	χ^2	df	S-Bχ^2	CFI*	ECVI*
Preadolescents (Grade 3)					
1 Initial	1147.11	536	843.28	.85	6.21
2 Addition of: 2 significant paths[a]	1046.52	534	728.64	.93	5.55
3 Deletion of: 4 nonsignificant paths[b]	695.95	359	448.16	.95	3.62
Early Adolescents (Grade 7)					
1 Initial	1323.29	606	1120.13	.85	7.55
2 Addition of: 5 significant paths[c] 2 correlated errors[d]	1064.19	599	778.03	.95	5.67
3 Deletion of: 4 nonsignificant paths[e]	941.16	537	794.30	.92	5.63
Late Adolescents (Grade 11)					
1 Initial	1007.94	609	852.56	.90	7.32
2 Addition of: 4 significant paths[f]	902.32	605	763.64	.93	6.76
3 Deletion of: 2 nonsignificant paths[g] 1 correlated error[h]	817.18	541	722.48	.93	6.34

[a] Social self-concept (SSC; classroom) → SSC (teachers); SSC (parents) → SSC (teachers)

[b] SSC (family) → SSC (general); behavioral conduct (BC; teachers) → SSC (teachers); BC (siblings) → SSC (siblings); BC (parents) -> SSC (parents)

[c] SSC (family) → general SC; SSC (siblings) → SSC (parents); SSC (parents) → SSC (teachers); SSC (teachers) → general SC; SSC (siblings) → SSC (teachers)

[d] Correlations between: teacher rating indicators of BC (classmates) and BC (teachers); SPPC (Harter, 1985) indicators of GSC

[e] SSC (teachers) → SSC (school); SSC (siblings) → SSC (family); SSC (siblings) → SSC (teachers); SSC (family) → SSC (general); BC (teachers) → SSC (teachers)

[f] SSC (same sex) → SSC (teachers); SSC (parents) → general SC; SSC (parents) → SSC (teachers); SSC (siblings) → SSC (parents)

[g] SSC (family) → SSC (general); BC (teachers) → SSC (teachers)

[h] Correlations between parent rating indicators of BC (parents) and BC (siblings)

Figure Caption

Figure 1: The multidimensional, hierarchical model of self-concept proposed by Shavelson, Hubner, and Stanton (1976). Copyright permission to be obtained from publisher.

Figure 2: Hypothesized model of social self-concept.

Figure 3: Summary of latent construct relations for preadolescents, early adolescents, and late adolescents (excluding same-sex/opposite-sex social self-concept facets).

Figure 4: Summary of latent construct relations, including same-sex/opposite-sex social self-concept, for early and late adolescents.

Figure 5: Final model of social self-concept structure and causal flow for preadolescents (grade 3).

Figure 6: Final model of social self-concept structure and causal flow for early adolescents (grade 7).

Figure 7: Final model of social self-concept structure and causal flow for late adolescents (grade 11).

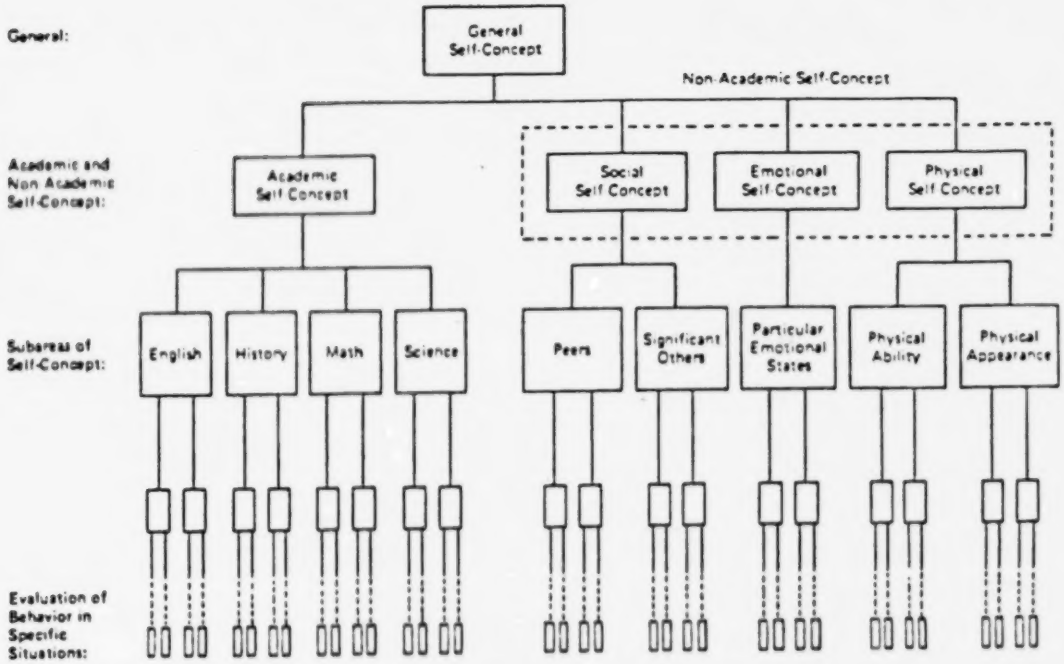

FIG. 16.1. Structure of self-concept (Shavelson, Hubner, & Stanton, 1976).

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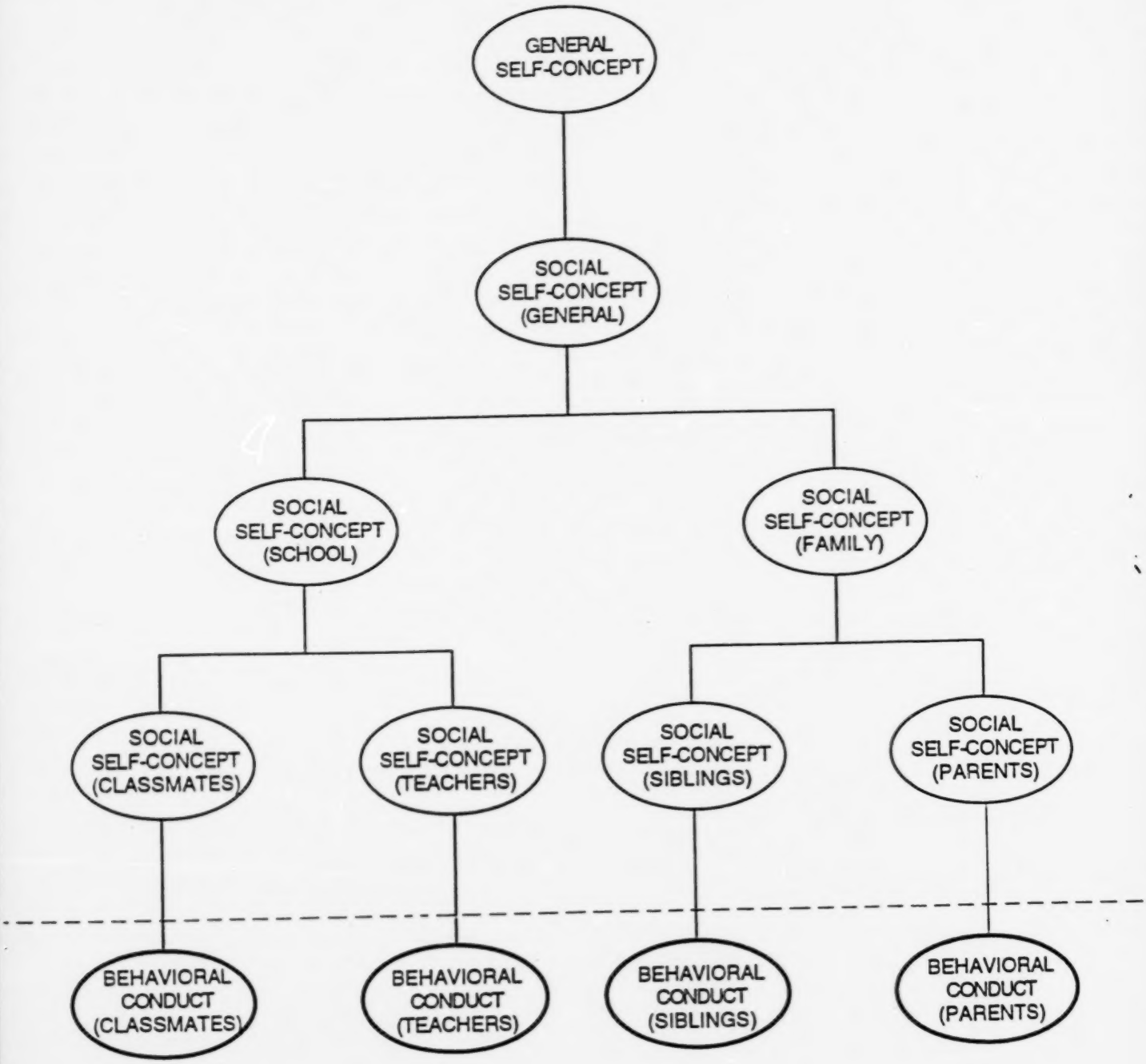
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SOCIAL SELF-CONCEPT (TEACHERS)
SOCIAL SELF-CONCEPT (SIBLINGS)
SOCIAL SELF-CONCEPT (PARENTS)
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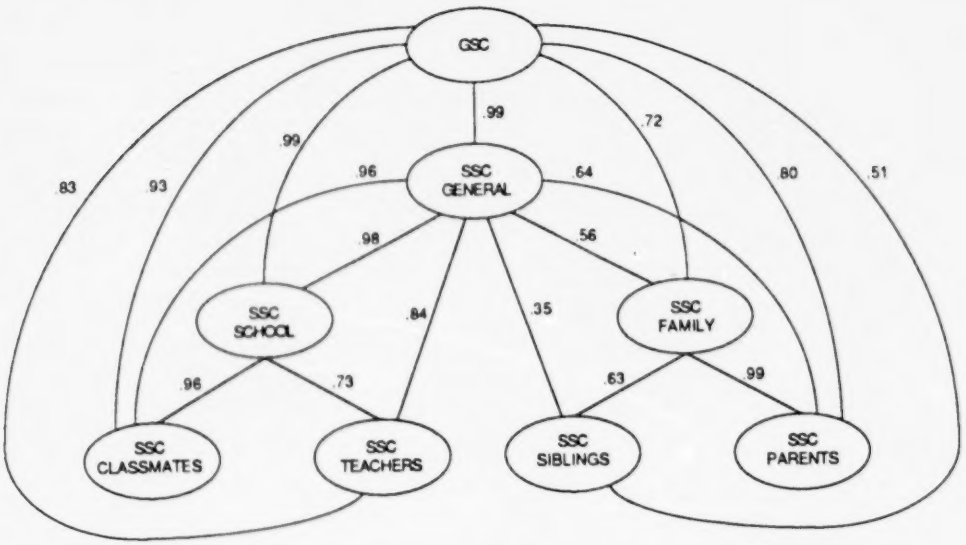
BEHAVIORAL CONDUCT (PARENTS)



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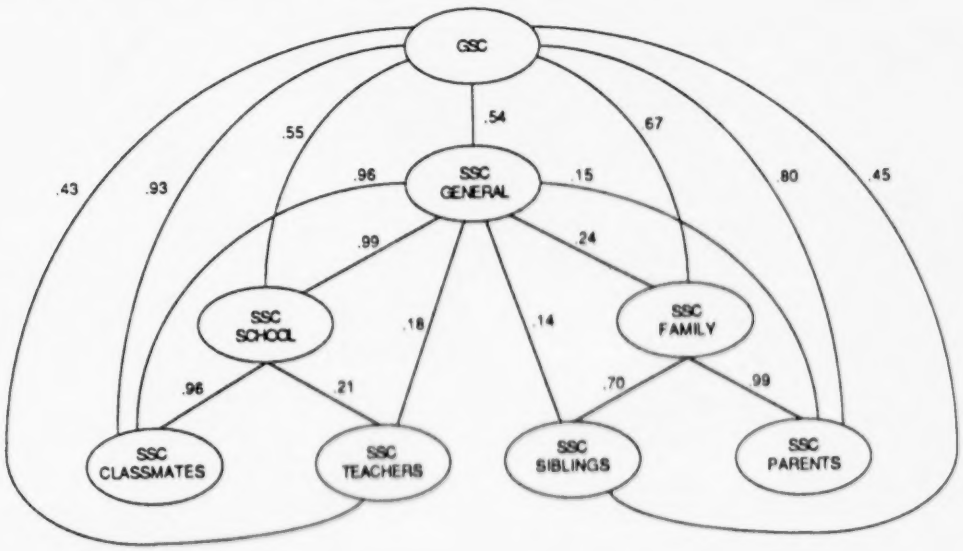

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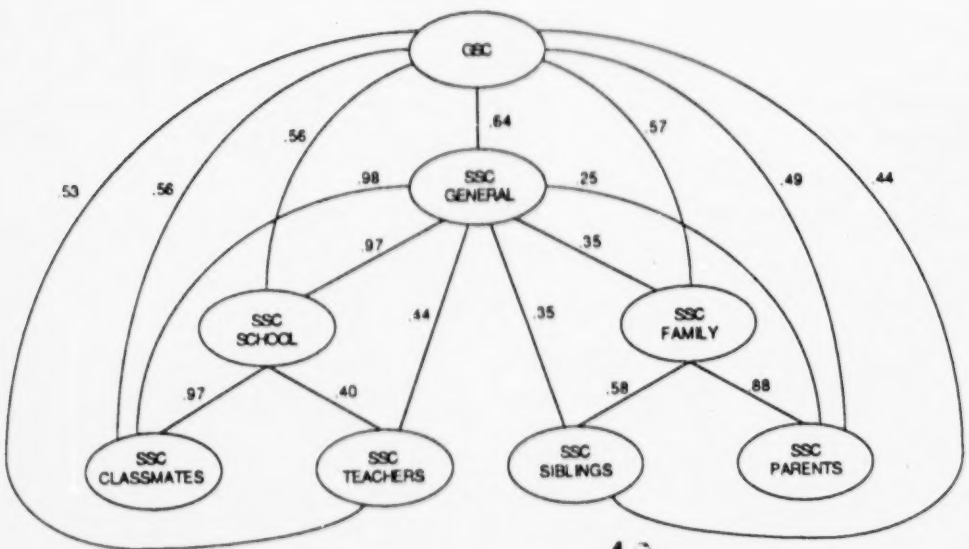

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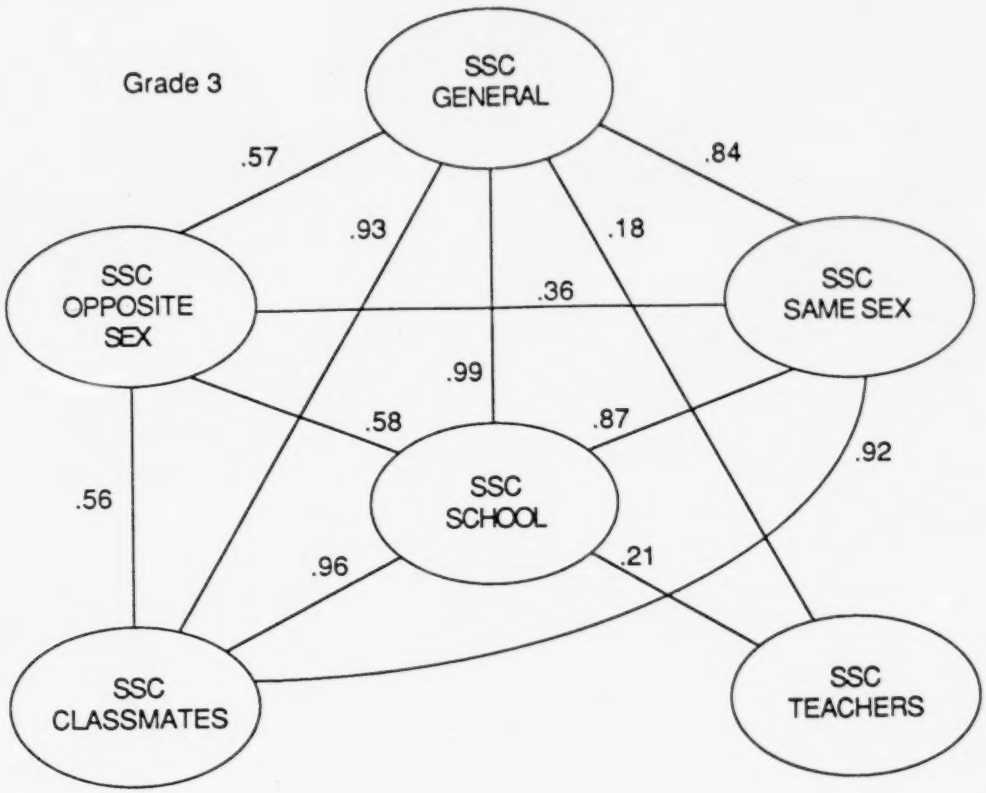
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SSC OPPOSITE SEX
SSC SAME SEX
SSC SCHOOL
SSC CLASSMATES
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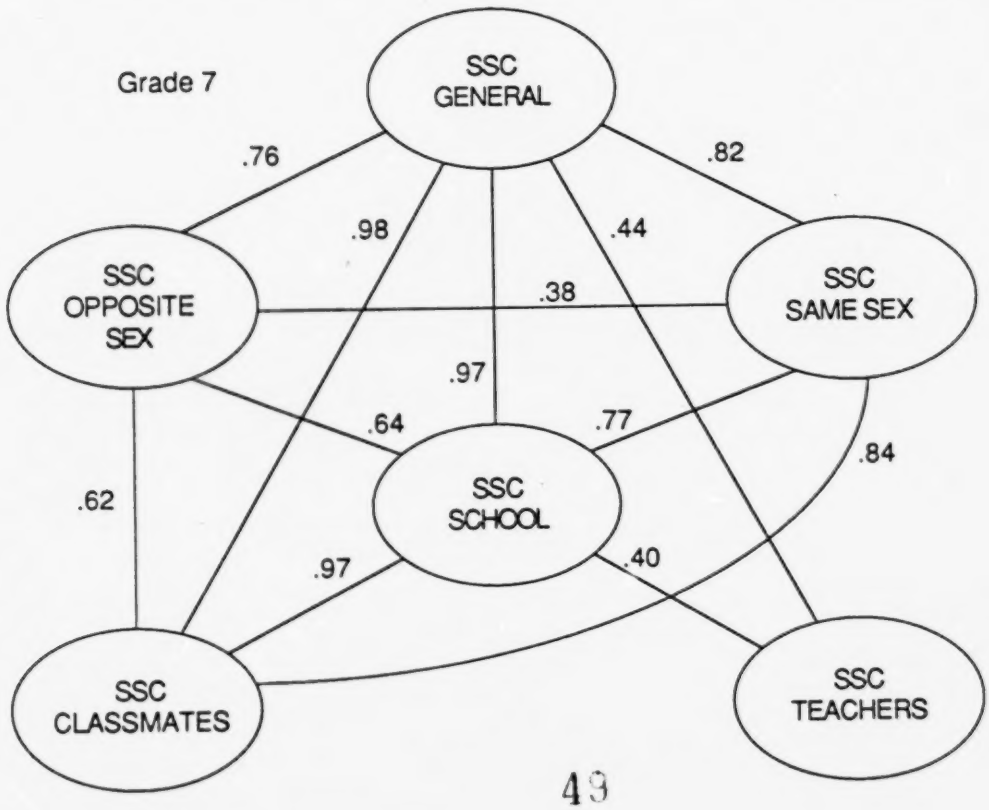
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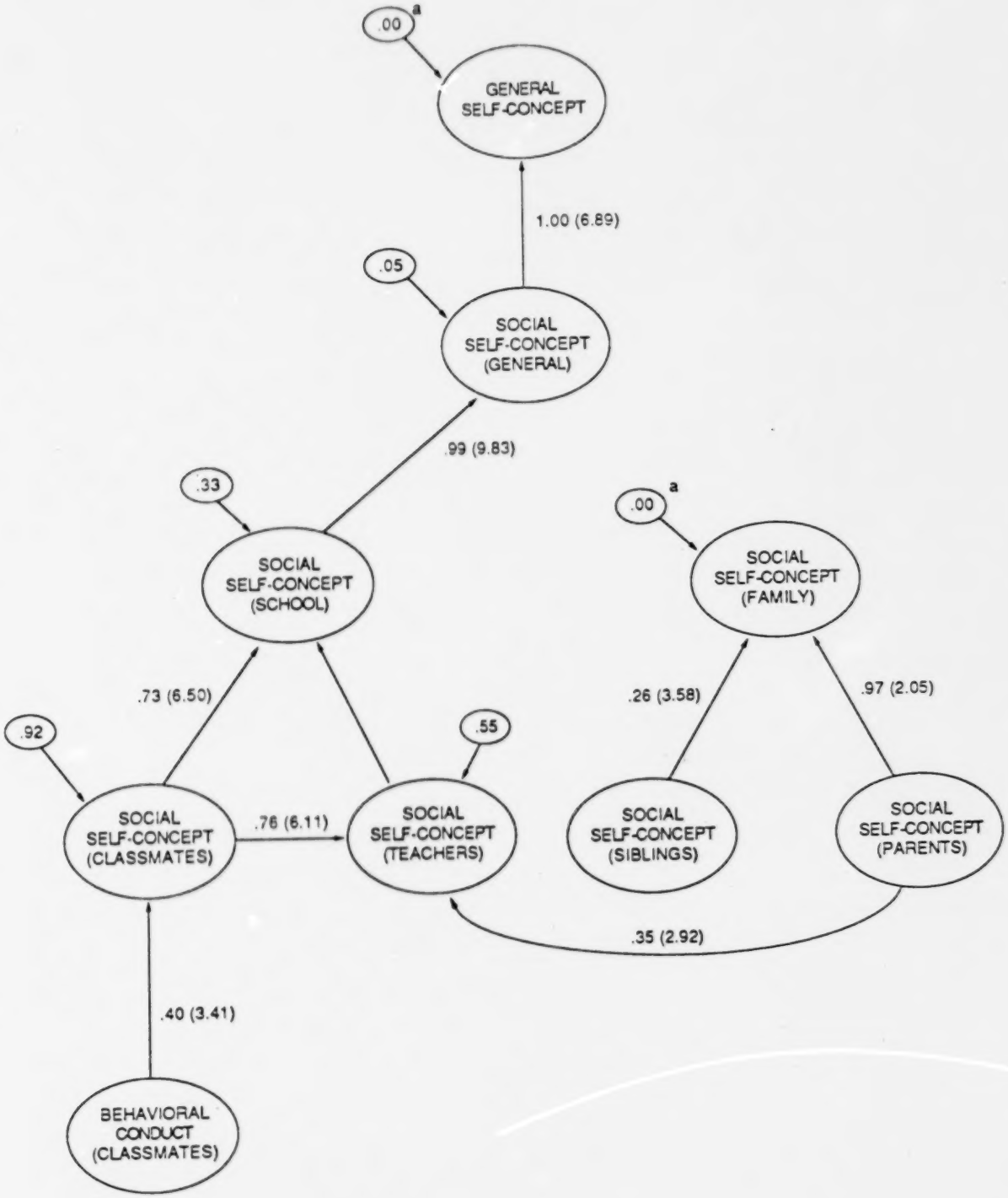
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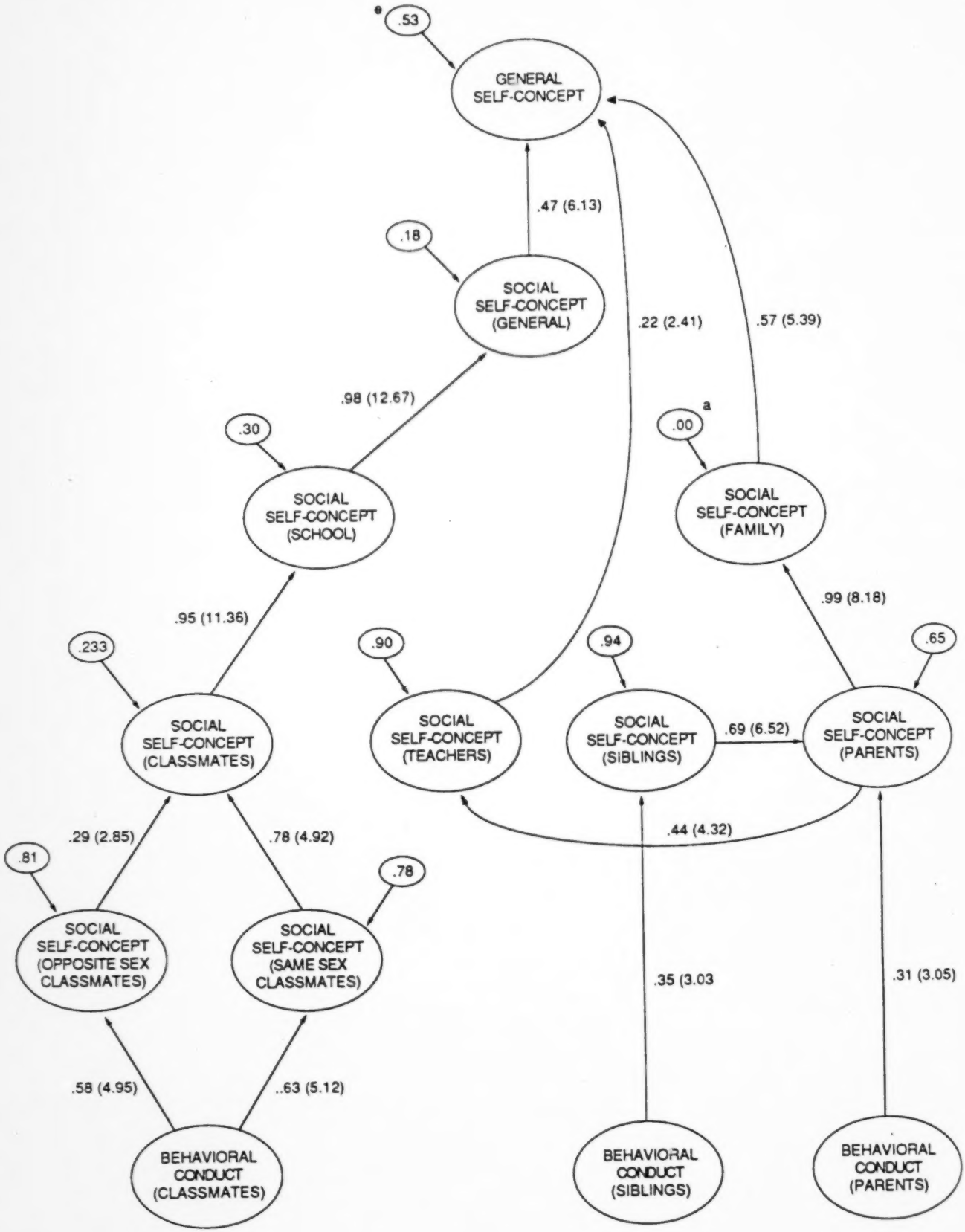
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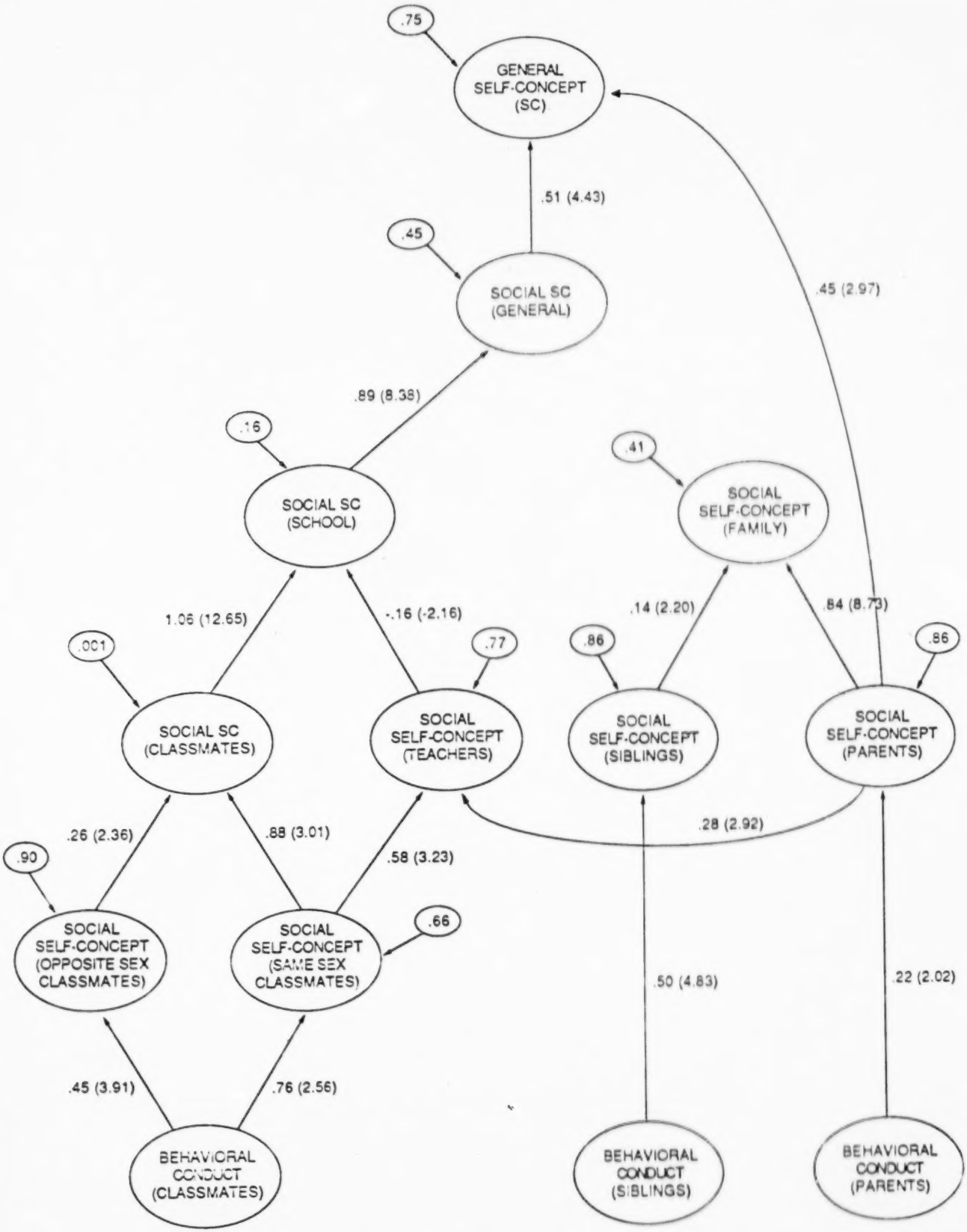
BEHAVIORAL CONDUCT (SIBLINGS)
BEHAVIORAL CONDUCT (PARENTS)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SOCIAL SELF-CONCEPT (PARENTS)
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SOCIAL SELF-CONCEPT (SAME SEX CLASSMATES)
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BEHAVIORAL CONDUCT (CLASSMATES)
BEHAVIORAL CONDUCT (SIBLINGS)
BEHAVIORAL CONDUCT (PARENTS)